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Growth of the Waste of Electrical and Electronics Equipment Generation in India

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Abstract: **- In this paper has deeply discussed and analysis with the Dumping of the Waste of Electrical and Electronics Equipments in public places , Growth of the WEEE and water resources are creating serious health hazards and unless and until it is controlled the reaction out of this world cause infection which would create a lot of disadvantage to the society . The major problem that the human race is facing now is the effects of the E-pollution caused by the waste of Electrical and Electronics Equipments. So, there should be a rule to prevent the people from damaging the ecosystem of our country to save nature to save people. The implementation of different ways for the prohibition of dumping WEEE should be sanctioned by the legal system. We should be activated by the Legal action to control the WEEE. An economic solution and different disiplinary are designed to achieve an optimal source to reuse and reduce the WEEE.**
Keywords: **E-pollution, Backyard recycling, Energy re-usage, Innovation, Growth ratio**

I. INTRODUCTION

Waste of Electrical and Electronics Equipments or Electronic Waste or E-Waste or WEEE is any broken or unwanted electrical or electronic appliance. WEEE includes computers, entertainment electronics, mobile phones and other items that have been discarded by their original users. Waste of Electrical and Electronics Equipments is the most rapidly growing waste problem in the world. It is a crisis of not quantity alone but also a crisis born from toxics ingredients, posing a threat to the occupational health as well as the environment. Rapid technology change, low initial cost, high obsolescence rate have resulted in a fast growing problem around the globe. Legal framework, proper collection system missing. Imports regularly coming to the recycling markets. Inhuman working conditions for recycling. There are about 94 types of electronic products as re-selling illegally by recycling methods.

A.E-Waste: Growth

1.IT and telecom are two fastest growing industries in the country

India, by 2008, should achieve a PC penetration of 65 per 1,000 from the existing 14 per 1,000 (MAIT). At present, India has 15 million computers. The target being 75 million computers by 2010. Over 2 million old PCs ready for disposal in India. Life of a computer reduced from 7 years to 3-5 years Over 75 million current mobile users, expected to increase to 200 million by 2007 end. Memory devices, MP3 players, iPods etc. are the newer additions.Preliminary estimates suggest that total WEEE generation in India is approximately 1,46,000 tonnes per year.

2. E-Waste Growth in India

As there is no separate collection of e-waste in India, there is no clear data on the quantity generated and disposed of each year and the resulting extent of environmental risk. The preferred practice to get rid of obsolete electronic items in India is to get them in exchange from retailers. when purchasing a new item. The business sector is estimated to account for 78% of all installed computers in India (Toxics Link, 2003). Obsolete computers from the business sector are sold by auctions. Sometimes educational institutes or charitable institutions receive old computers for reuse. It is estimated that the total number of obsolete personal computers emanating each year from business and individual households in India will be around 1.38 million. According to a report of Confederation of Indian Industries, the total waste generated by obsolete or broken down electronic and electrical equipment in India has been estimated to be 1,46,000 tons per year .The results of a field survey conducted in the Chennai, a metropolitan city of India to assess the average usage and life of the personal computers (PCs), television (TV) and mobile phone showed that the average household usage of the PC ranges from 0.39 to 1.70 depending on the income class . In the case of TV it varied from 1.07 to 1.78 and for mobile phones it varied from 0.88 to 1.70. The low-income households use the PC for 5.94 years, TV for 8.16 years and the mobile phones for 2.34 years while, the upper income class uses the PC for 3.21 years, TV for 5.13 years and mobile phones for 1.63 years. Although the per-capita waste production in India is still relatively small, the total absolute volume of wastes generated will be huge. Further, it is growing at a faster rate. The growth rate of the mobile

phones (80%) is very high compared to that of PC (20%) and TV (18%). The public awareness on e-wastes and the willingness of the public to pay for e-waste management as assessed during the study based on an organized questionnaire revealed that about 50% of the public are aware of environmental and health impacts of the electronic items. The willingness of public to pay for e-waste management ranges from 3.57% to 5.92% of the product cost for PC, 3.94 % to 5.95 % for TV and 3.4 % to 5 % for the mobile phones. Additionally considerable quantities of e-waste are reported to be imported. However, no confirmed figures available on how substantial are these trans boundary e-waste streams, as most of such trade in e-waste is camouflaged and conducted under the pretext of obtaining 'reusable' equipment or 'donations' from developed nations. The government trade data does not distinguish between imports of new and old computers and peripheral parts and so it is difficult to track what share of imports is used electronic goods.

II STATUS OF E-WASTE MANAGEMENT IN INDIA

Despite a wide range of environmental legislation in India there are no specific laws or guidelines for electronic waste or computer waste . As per the Hazardous Waste Rules (1989), e-waste is not treated as hazardous unless proved to have higher concentration of certain substances. Though PCBs and CRTs would always exceed these parameters, there are several grey areas that need to be addressed. Basel Convention has Waste electronic assemblies in A1180 and mirror entry in B1110, mainly on concerns of mercury, lead and cadmium. Electronic waste is included under List-A and List-B of Schedule-3 of the Hazardous Wastes (Management & Handling) Rules, 1989 as amended in 2000 & 2003. The import of this waste therefore requires specific permission of the Ministry of Environment and Forests. As the collection and re-cycling of electronic wastes is being done by the informal sector in the country at present, the Government has taken the following action/steps to enhance awareness about environmentally sound management of electronic waste : • Several Workshops on Electronic Waste Management was organised by the Central Pollution Control Board (CPCB) in collaboration with Toxics Link, and CII . Action has been initiated by CPCB for rapid assessment of the E-Waste generated in major cities of the country. A National Working Group has been constituted for formulating a strategy for E-Waste management. A comprehensive technical guide on "Environmental Management for Information Technology Industry in India" has been published and circulated widely by the Department of Information Technology (DIT), Ministry of Communication and Information Technology. Demonstration projects have also been set up by the DIT at the Indian Telephone Industries for recovery of copper from Printed Circuit Boards. Although awareness and readiness for implementing improvements is increasing rapidly, the major obstacles to manage the e wastes safely and effectively remain. These include the lack of reliable data that poses a challenge to policy makers wishing to design an e-waste management strategy and to an industry wishing to make rational investment decisions. Only a fraction of the e waste (estimated 10%) finds its way to recyclers due to absence of an efficient take back scheme for consumers, The lack of a safe e waste recycling infrastructure in the formal sector and thus reliance on the capacities of the informal sector pose severe risks to the environment and human health. The existing e waste recycling systems are purely business-driven that have come about without any government intervention. Any development in these e waste sectors will have to be built on the existing set-up as the waste collection and pre-processing can be handled efficiently by the informal sector, at the same time offer numerous job opportunities. The Swiss State Secretariat for Economic Affairs mandated the Swiss Federal Laboratories for Materials Testing and Research (EMPA) to implement the programme "Knowledge Partnerships in e-Waste Recycling" and India is one of the partner countries. The programme aims at improving e-waste management systems through Knowledge Management and Capacity Building. It has analyzed e-waste recycling frameworks and processes in different parts of the world

III WASTE MANAGEMENT STRATEGIES

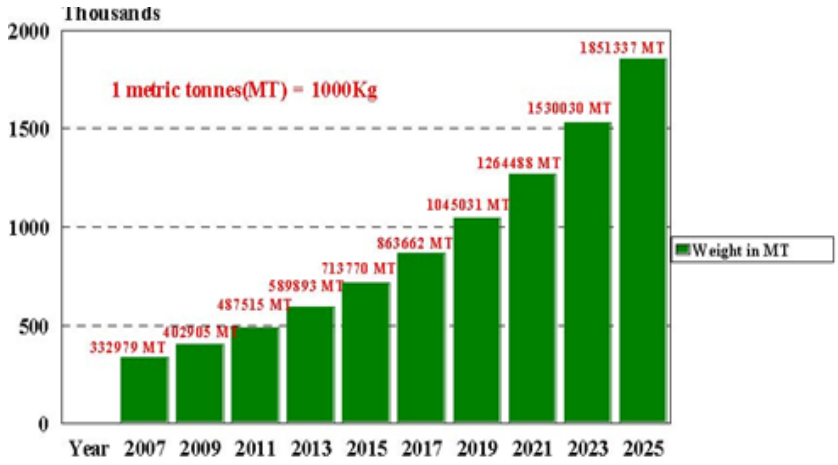
The best option for dealing with E wastes is to reduce the volume. Designers should ensure that the product is built for re-use, repair and/or upgradeability. Stress should be laid on use of less toxic, easily recoverable and recyclable materials which can be taken back for refurbishment, remanufacturing, disassembly and reuse. Recycling and reuse of material are the next level of potential options to reduce e-waste .Recovery of metals, plastic, glass and other materials reduces the magnitude of e-waste. These options have a potential to conserve the energy and keep the environment free of toxic material that would otherwise have been released.It is high time the manufactures, consumers, regulators, municipal authorities, state governments, and policy makers take up the matter seriously so that the different critical elements depicted in Figure 1 are addressed in an integrated manner. It is the need of the hour to have an "e waste-policy" and national regulatory frame work for promotion of such activities. An e Waste Policy is best created by those who understand the issues. So it is best for industry to initiate policy formation collectively, but with user involvement. Sustainability of e-waste management systems has to be ensured by improving the effectiveness of collection and recycling systems (e.g., public–private-partnerships in setting up buy-back or drop-off centers) and by designing-in additional funding e.g., advance recycling fees.

IV. ENFORCEMENT AGENCIES IN INDIA

A.Indian Enforcement Agencies involved in E-waste

Ministry of Environment and Forests, Government of India is responsible in identification of hazardous wastes and provides permission to exporters and importers under the Environment (protection) Act, 1986. Central Pollution Control Board (CPCB) was constituted under the Water (Prevention and Control of Pollution) Act, 1974. CPCB coordinates activities with the State Pollution Control Boards and ensures implementations of the conditions of imports. It also monitors the compliance of the conditions of authorization, import and export and conduct training courses for authorities dealing with management of hazardous wastesand to recommend standards for treatment, disposal of waste, leachate and specifications of materials and recommend procedures for characterization of hazardous wastes. State Pollution Control Boards (SPCB) constituted under the Water (Prevention and Control of Pollution) Act, 1974 to grant and renew authorization, to monitor the compliance of the various provisions and conditions of authorization, to forward the application for imports by importers and to review matters pertaining to identification and notification of disposal sites. Directorate General of Foreign Trade constituted under the Foreign Trade (Development & regulation) Act 1992 to grant/ refuse licence for hazardous wastes prohibited for imports under the Environment (protection) Act, 1986. Port Authorities and Customs Authorities under the customs Act, 1962 verify the documents and inform the Ministry of Environment and Forests of any illegal traffic and analyze wastes permitted for imports and exports and also train officials on the provisions of the Hazardous Wastes Rules and in analysis of hazardous wastes. The Directorate General of Foreign Trade (DGFT) is the certifying authority for permitting imports of second-hand goods.

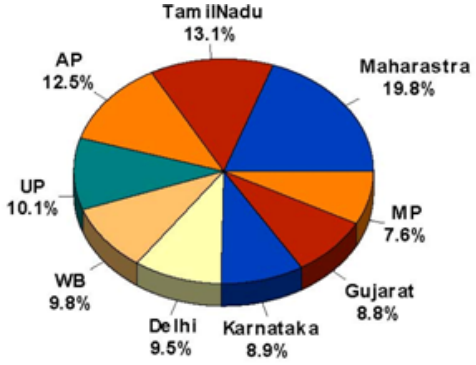
B. State and City wise Electronics Waste generation in India



(source: http:// 79. *See* http://www.ciwmb.ca.gov/Electronics.)

Fig.1Growth of E-waste in India

The total WEEE generation in India has been estimated to be 146180 tonnes per year based on selected EEE tracers' items. In India, among top ten cities, Mumbai ranks first in generating E- waste followed by Delhi, Bangalore, Chennai, Kolkata, Ahmadabad, Hyderabad, Pune, Surat and Nagpur. The 65 cities generate more than 60% of the total generated e-waste, whereas, 10 states generate 70% of the total e-waste.

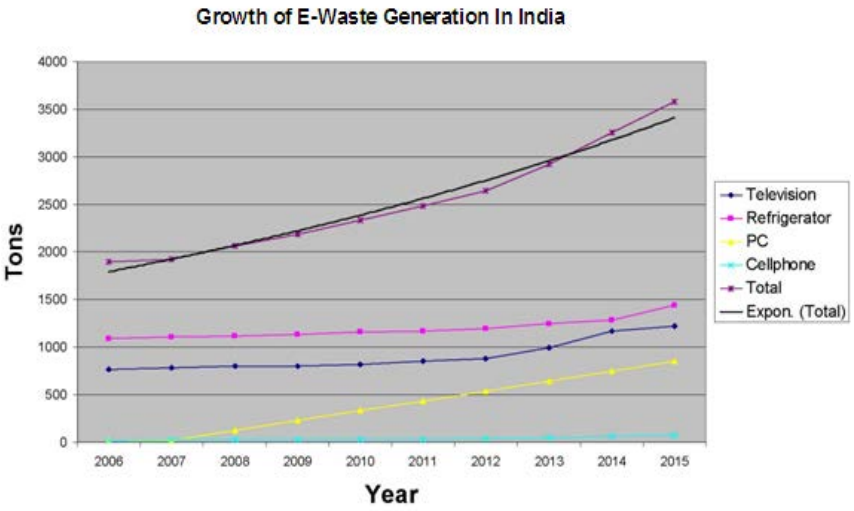


(source: http://at http://www.ci.seattle.wa.us..)

Fig.2 State wise E-waste generation in india

V. INVENTORY OF ELECTRONICS WASTE

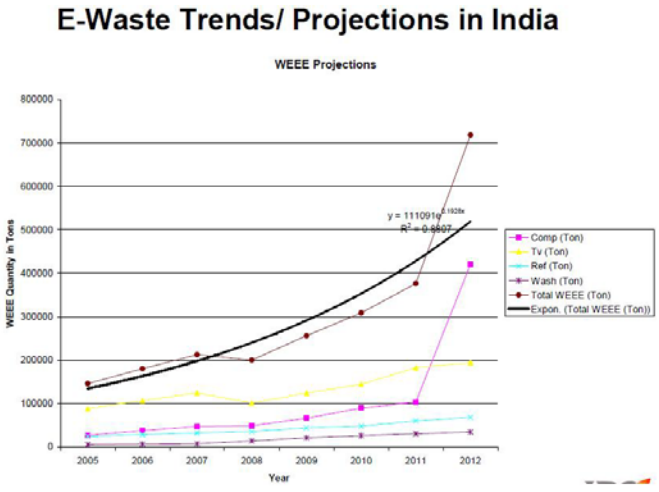
Actual data on generation or import of E-waste is not currently available in India. Several studies have been conducted by various agencies to find out the inventory of e-waste in the country. Most of these studies are based on the model of obsolescence of electronic products, which needs to be validated with the field data. A survey was carried out by the Central Pollution Control Board (CPCB) during 2005. It was estimated that 1.347 lakh MT of e-waste was generated in the country in the year 2005, which is expected to increase to about 8.0 lakh MT by 2012. During 2007, Manufacturers' association for Information Technology (MAIT), India and GTZ, India had, however, carried out an inventory on e-waste, arising out of three products: computers, mobile phones, and televisions. The total quantities of generated e-waste in India, during 2007, were 3, 32, 979 Metric Tonnes (MT) (Computer: 56324MT, Mobile Phones: 1655MT, and Televisions: 275000MT).
The finding of the study is given as under:



(*source:* http://www.ci.seattle.wa.us/util/solidwaste/disposal.htm.)

Fig.3 Growth of E-waste generation in India

Current E-waste generation doubles by 2015 in MMR (25,000 t to >50,000 t) Current E-waste generation riples by 2015 in Maharashtra (49,458 t to > 1,77, 217 t) Increase in environment related E-waste issues both at MMR and State level Lack of E-waste related environmental infrastructure in formal sector in the state Loss of recoverable resources at MMR and state level.



(source: http://www.cpcb.nic.in/divisionsofheadoffice/hwmd/e-Waste.pdf).

Fig.4 E-waste trends/projections in India

VI. GROWTH OF BIOMEDICAL WASTE

Of the 1,60,000 MT of Solid Waste generated per day in the country, 2% is biomedical aste.This is governed by Bio-medical waste (Mgt and Handling Rules 1998.Most of the larger hospitals, nursing homes and other Health Care facilities are concentrated around cities and towns. Rural areas are serviced through primary and community health care centres.It is well established that bigger the healthcare facility, the more bio-medical waste it generates. At present India which generates about 1 million tons of biomedical waste per day, has hardly 100 established common biomedical waste Treatment facilities in different parts of the country most of which are in and around bigger cities and Towns. Biomedical waste treatment is generally on PPP mode.E-waste is a collective terminology for the entire stream of electronic equipment such as TVs, refrigerators, telephones, air conditioners, computers, mobile phones etc. that has eached itsend of life (EOL) for its current user. Such devices are generally considered toxic when disassembled or incinerated and are typically targeted for hazardous disposal or are slated for recovery and reuse. As a result, the E-waste industry is emerging with markets that need to be assessed for growth potential.

A. MARKET SIZE

World-wide, the UN estimates that between 20 and 50 million tons of e-waste is generated every year and approximately 12 million tons of this comes from Asian countries. It is estimated that the global market for electronic waste will rise at an average annual growth rate of 8.8 per cent from USD 7.2 billion in 2004 to USD 11 billion in 2009 (source: Electronic Waste Recovery Business). Although much of the E-waste comes from developed countries in India, much of it also originates from within India. As of March 2009, approximately ***400,000 tons of e-waste was roduced in India***; 19,000 tons of this comes from Mumbai, the largest e-waste generator in India.

B.GROWTH PROSPECTS

E-waste has been mounting rapidly with the rise of the information society as the rate of obsolescence of electronic equipment is rising. E-waste is the fastest growing segment of the MSW stream. E-waste equals 1% of solid waste on average in developed countries and is expected to grow to 2 % by 2010. In developing countries, like India, E-waste as a percentage of solid waste can range from 0.01 % to 1 %. Globally, computer sales continue to grow at 10 % plus rates annually. Sales of DVD players are doubling year over year. Yet the lifecycle of these products are shortening, shrinking to 10 years for a television set to 2 or 3 years for a computer. As a result, a high percentage of electronics are ending up in the waste stream releasing dangerous toxins into the environment.

C.CONCERN FOR INDIA

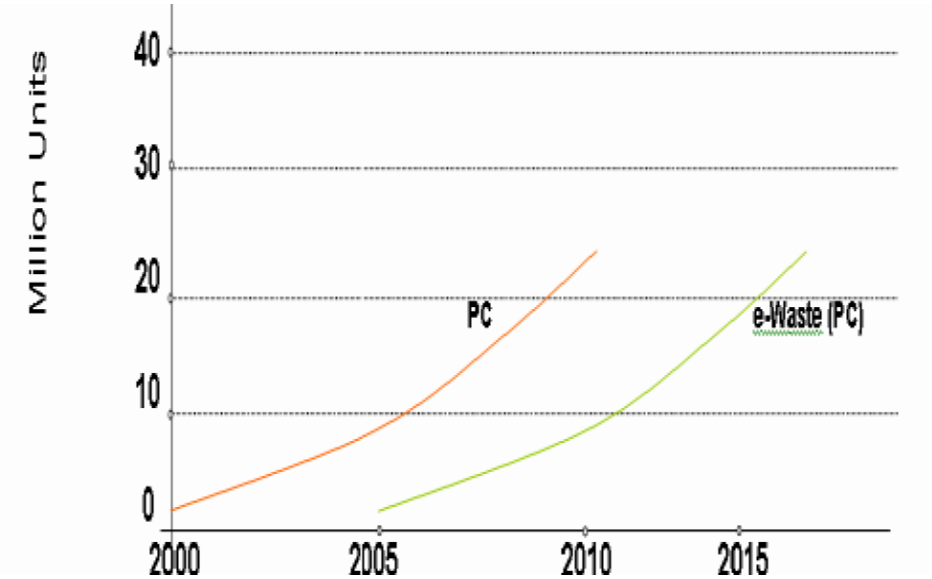
After China imposed a ban on the import of e-waste in 2002; there is a concern that India may emerge as one of the largest dumping grounds for the developed world. Once the electronic equipment, mostly computers, turns obsolete in the West, they are mostly exported as e-waste into the South Asian market. The E-waste related laws in India includes (i) Hazardous Waste (Management and Handling) Amended Rules, 2003: In Schedule 1, waste generated from the electronic industry is considered as hazardous waste, and (ii) DGFT (EXIM policy 2002-07): Second hand personal computers/laptops are not permitted for import under EPCG scheme under the provisions of para 5.1 of the EXIM policy, even for service providers. Second hand photocopiers machines, air conditioners, diesel generating sets, etc, can also not be imported even if these are less than ten years old. However, the classification of e-waste as hazardous in Indian legislation is still unclear as its status depends upon the extent of presence of hazardous constituents in it and there are no specific laws or guidelines for e-waste. Hence, there is an impressive need for stringent norms and regulations for handling e-waste in India.

VII. FINDINGS STATED IN REPORT BY *BAN*

50 to 80% E-wastes collected are exported for recycling by U.S. Export is legal in U.S. Export is due to cheaper labour and laxed standard in poor countries. E-waste recycling and disposal in China, India and Pakistan are highly polluting. China has banned import of E-waste . Electronic waste is generated by three major sectors in the United States. Individuals and small businesses large businesses, institutions, and governments original equipment manufacturers (OEMs).

A.INDIVIDUALS AND SMALL BUSINESSES

Electronic equipment and computers in particular, are often discarded by households and small businesses, not because they are broken but simply because new technology has left them obsolete or undesirable. With today's computer industry delivering new technologies and 'upgrades' to the market about every 18 months, the useful life-span of a personal computer has shrunk from four or five years down to two years. Often new software is incompatible or insufficient with older hardware so that customers are forced to buy new ones. Due to legal exemptions in the definitions of solid and hazardous wastes, household and small business users are legally allowed to simply dump their computers into their trashcans for disposal in the local landfill or incinerator. The only exceptions to that so far are in California and Massachusetts where landfill bans have been passed. Thus, the present legal loophole makes landfill disposal preferrable. In fact, if a consumer goes to a recycler, they most likely will be charged a front-end fee (for monitors). By avoiding recyclers altogether, and simply throwing it in a dumpster, disposal of E-waste is no more costly than throwing away an orange peel.



(source: http://www.cpcb.nic.in/divisionsofheadoffice/hwmd/e-Waste.pdf).

Fig.5 E-Waste Growth

TABLE I WEE GENERATION TOP TEN STATES

Sr.No.	STATES	WEE (Tonnes)
1	MAHARASHTRA	20270.59
2	TAMIL NADU	13486.24
3	ANDHRA PRADESH	12780.33
4	UTTAR PRADESH	10381.11
5	WEST BENGAL	10059.36
6	DELHI	9729.15
7	KARNATAKA	9118.74
8	GUJARAT	8994.33
9	MADHYA PRADESH	7800.62
10	PUNJAB	6958.46

(*source:* http://www.fas.org/irp/doddir/navy/5239_26.htm).

B.LARGE CORPORATIONS, INSTITUTIONS, AND GOVERNMENT

Large users upgrade employee computers regularly. For example, Microsoft, with over 50,000 employees worldwide (some of whom have more than one computer) replaces each computer about every three years.11 By law it is illegal for these large users to dispose of computers via landfill and thus, this E-waste goes to the re-use/recycling/export market. Some large companies lease their computers from leasing companies, who take back working and non-working computers at the end of contracts. Leasing companies take out hundreds or thousands of computers at a time and in turn resell them to brokers in the reuse/export markets. The volume of leased computers is huge in comparison to sales of new computers to corporations.12 Even the federal government is now getting into leasing rather than buying computers which by law they cannot send to landfills.

C.ORIGINAL EQUIPMENT MANUFACTURERS (OEMS)

OEMs generate E-waste when units coming off the production line don't meet quality standards, and must be disposed of. Some of the computer manufacturers contract with recycling companies to handle their electronic waste, which often is exported.

The volume of obsolete computers thrown out or temporarily stored for later disposal is already a serious

problem that is escalating at a rapid rate. Currently, and unfortunately, the vast majority of E-waste ends up in our landfills or incinerators. While there are efforts to divert E-waste from landfills, via "recycling", electronics "recycling" is a misleading characterization of many disparate practices – including de-manufacturing, dismantling, shredding, burning, exporting, etc. – that is mostly unregulated and often creates additional hazards itself[14]. "Recycling" of hazardous wastes, even under the best of circumstances, has little environmental benefit – it simply moves the hazards into secondary products that eventually have to be disposed of. Unless the goal is to redesign the product to use non-hazardous materials, such recycling is a false solution. Current market conditions and manufacturing methods and inputs discourage environmentally sound electronic recycling practices, so most E-waste that is currently being "recycled" is actually being exported, dismantled in prisons, or shredded in processes where there is some material recovery followed by the discard of the remaining materials.

VIII. CONCLUSION

WEEE recycling is the process of converting WEEE into usable things which is good for the economy due to five main reasons. Safe disposal of electrical and electronic wastes can be done. Materials like precious metals, plastics etc., can be recovered and also can be reused. More employment opportunities can be made separately for this process. Environmental and commonly all other pollutions can be controlled to a considerable amount by this process. Economical down flow can also be controlled by using this recycling process. The various solutions including recycling, re-use, standardization of technologies and implementation of law for less rapid obsolesce are applied. In 2020 the formation of WEEE will be above 40000 tonnes per day following the four R's resource use to control the WEEE: Refuse, Reduce, Reuse, and Recycle.

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